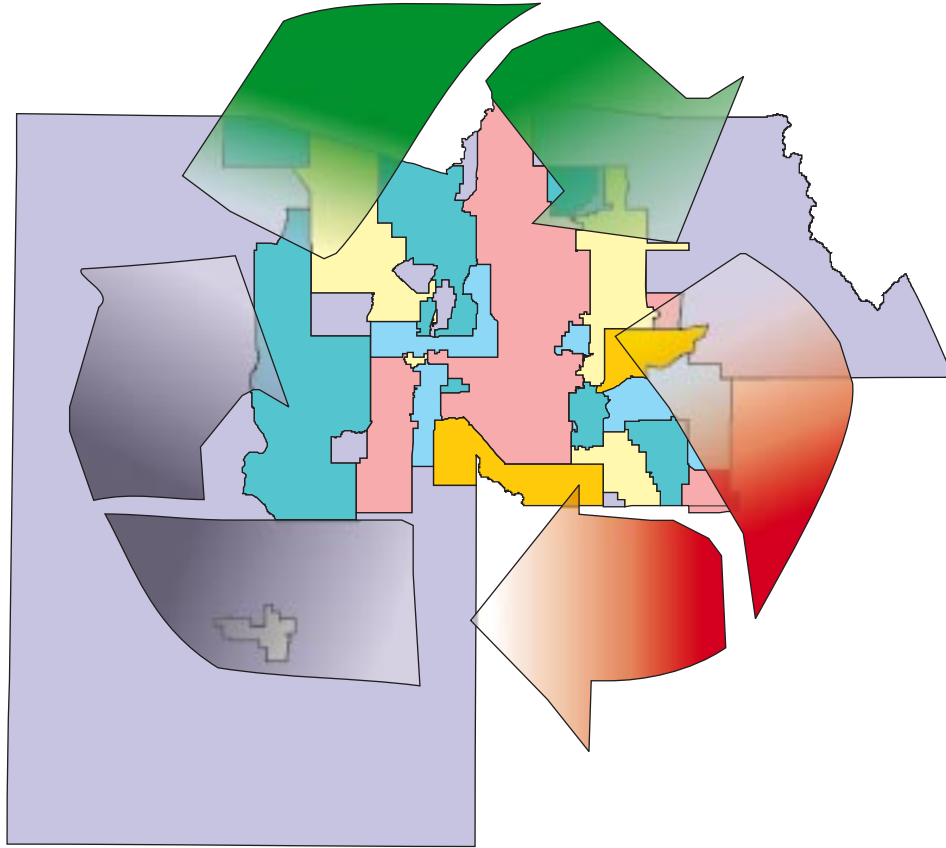


# **REGIONAL RECYCLING GUIDANCE DOCUMENT**



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## **INTRODUCTION**

Designing and maintaining an efficient recycling program requires making interrelated decisions about collecting, marketing and processing recyclables. Recently, a need has been recognized for local recycling information to be analyzed and shared at a regional level to increase the opportunity for and effectiveness of local programs. This guidance document is designed to provide a basic foundation of information and a list of resources for further technical assistance in establishing and maintaining recycling programs in the MAG region.

This guidance document contains:

- Summary of recent conditions
- Information regarding tools that could assist in establishing or expanding a program
- Potential incentives and obstacles in recycling
- List of entities that could provide further assistance

## **SUMMARY OF RECENT CONDITIONS**

### **Study Area**

The Maricopa Association of Governments (MAG) is a Council of Governments that serves as the regional agency for the Maricopa County area. The organization was formed when the elected officials recognized a need for policy development and long range planning on a regional scale. The members include 24 cities and towns, Maricopa County, two Indian communities and the State Department of Transportation. Of the total resident population in the state of Arizona, 59 percent live within the service area of MAG. MAG is the designated Regional Solid Waste Management Planning Agency for the Maricopa County area. This designation was made by Governor Bruce Babbitt on January 10, 1979, pursuant to Section 4006 (b) of the Resource Conservation and Recovery Act.

### **Current Trends**

Trends in solid waste management can be examined at the national, state and local level. In 1996, a total of 209.7 million tons of municipal solid waste was generated in the United States. This reflects a decrease of nearly two million tons from the previous year. Furthermore, 57 million tons of material were recycled from the waste stream in 1996. Therefore, 27 percent of the waste stream was recovered by recycling (including composting) in the nation. The average amount of waste generated per person in the United States was 4.3 pounds per day. The components of the national waste stream are demonstrated in Figure 1. Paper and paperboard make up a large portion of the waste stream, 38.1 percent. The next largest portion of the waste stream is yard trimmings at 13.4 percent. National data is the most readily available source of information, however, it does not account for local characteristics.

In the State of Arizona, a total of 5.14 million tons of municipal solid waste was reported as generated in-state during fiscal year 1997. The recycling rate for Arizona during 1997 was 18.1 percent. It should be noted, that many efforts were made to exclude non municipal waste (such as construction and demolition waste) and out-of-state waste in the state calculations. However, since it is unclear exactly how much non municipal solid waste and out-of-state waste is included in the total amounts reported by different entities, it is likely that the rates may be skewed. As the Arizona Department of Environmental Quality (ADEQ) collects more information, the amount of non municipal solid waste and out-of-state waste being landfilled in Arizona will become more certain. ADEQ anticipates that recycling rates will be closer to the national average as data collection is refined.

A map of landfills and material recovery facilities in the MAG region is included in Figure 2. Obtaining information that is sufficient for analysis on a local level as opposed to the state or national level is a priority for MAG. Several jurisdictions have provided information to MAG or ADEQ through recent surveys and the information provided by the respondents is greatly appreciated. However, in many cases an average of either local, state or national data was utilized to complete regional statistics. It is anticipated that improved information collection will continue to be achieved to further hone the results of regional data.

## **TOOLS FOR ESTABLISHING OR EXPANDING RECYCLING PROGRAMS**

To facilitate and encourage recycling in the MAG region, it was determined that examining the current solid waste management activity with a focus on recycling would be a valuable exercise at a local and regional level. In the MAG region, the recycling programs vary from sophisticated curbside programs to programs that are struggling to find the funds and expertise to exist. Each jurisdiction tailors its program to the needs and resources available in the community. The following discussion contains information on some of the tools that are available in the MAG region to fully evaluate

recycling programs for the purpose of initiating, maintaining or expanding a program. Specifically, the two resources discussed are the MAG Solid Waste Information Management System (SWIMS) and identifying the full costs of a recycling program.

### **Solid Waste Information Management System (SWIMS)**

The Solid Waste Information Management System (SWIMS) database is an overall planning instrument that incorporates socioeconomic, waste generation, waste disposal and recycling assumptions about the MAG region and the individual municipalities. The database has the capability to calculate past trends and current activities and also make predictions about the future based on scenarios that are practical and realistic. SWIMS was originally developed using data from 1989. The database was recently updated using information from the 1998 MAG Solid Waste Information Collection Effort, the Arizona Department of Environmental Quality 1997 Annual Waste Reduction and Recycling Survey and national data where information was not otherwise available.

SWIMS is a unique system for several main reasons. First, it analyzes waste by class. The classification system was developed to be compatible with locally collected waste stream data and local planning needs. Secondly, it analyzes waste management at a local level which allows for an accommodation of the unique nature of specific programs at a local or regional level. This is especially important when the region has such a diverse array of programs and circumstances. It is necessary, however, to make assumptions in the model. These assumptions can be altered to reflect changes in planning factors and to develop alternate scenarios. Constant effort to acquire, collect and maintain the data in the SWIMS database will ensure the best possible information for the valuable planning tool. A conceptual model of the system is included in Figure 3. A brief description of the system's components follows.

#### Waste Stream Classification

The separation of wastes into classes can facilitate analysis regarding management of solid waste such as identifying the varying generation rates and identifying socioeconomic determinants in parts of the waste stream that could be recycled. A classification system was developed in the 1991 MAG Regional Waste Stream Study to be compatible with locally collected waste stream data and local planning needs. Six nonhazardous solid waste classes were identified: residential waste, commercial/industrial waste, liquids and semisolid waste, construction waste, medical waste and green waste (previously termed landscape waste).

#### Geography

Geographical analysis can facilitate decision-making about disposal and transportation of recyclable materials and waste. The largest geographical boundary in the study area is Maricopa County. MAG also maintains socioeconomic and transportation planning databases for smaller geographical boundaries. Municipal Planning Areas (MPA) indicate the area of planning concern for the jurisdiction and tend to be larger than the municipalities and generally include some unincorporated

County areas. A Regional Analysis Zone (RAZ) is an area within an MPA and either can be coterminous with or may be aggregated to form an MPA. A Traffic Analysis Zone (TAZ) represents a subarea within a RAZ and is the smallest geographic unit for which variables are forecast.

Finally, Landfill Service Areas (LSA) are used to describe the primary service area for each landfill. These areas are mutually exclusive in the database based on generally recognized areas where wastes are generated for disposal in each respective landfill. In actual service delivery these boundaries may have some overlap.

### Generation Rates

Generation rates are determined for each class of waste. For the most part, the rates are determined by evaluating the amount of disposed waste when compared to the population, housing or employment levels. To measure the impacts of waste generation on solid waste management, the rates can be applied to the MAG socioeconomic forecasts to determine the projected amount of generated waste in years to come. A more detailed description of generation rates follows for each category of waste.

*Residential Waste* - The amount of residential household waste that is generated is primarily driven by the size of the population. The generation rates are based on estimates of the total amounts of residential waste disposed, as provided by the individual jurisdictions as recently as 1998, and the MAG population levels for the jurisdictions. This category of waste includes single family and multifamily residences.

*Commercial/Industrial Waste* - Commercial and industrial waste is a broad category of solid waste generated from commercial, office, educational, institutional and industrial sources. This waste category does not include liquid waste. Generation rates are based on the amounts of waste generated by the jurisdiction, reported as recently as 1998, and the levels of employment in each MPA.

*Liquid and Semisolid Waste* - This waste category consists of liquid waste and what is commonly referred to as sludge (semisolid waste). Sludge is a residual waste produced from both water and wastewater treatment plants and various other treatment processes. An estimate of the total amount of waste generated and disposed of in wastewater treatment facilities and in landfills is calculated based on information collected through interviews conducted in 1989 with personnel in charge of wastewater treatment facilities, landfill operators and personnel from the public works departments.

The generation rate for liquid and semisolid waste is determined by calculating a ratio of gallons per person. The adoption of a per capita rate for the county as a whole may underestimate the production of the waste in some geographical areas by distributing this proportion of the waste stream to the entire county population.

*Construction Waste* - The generation rate is based on new construction activity for residential,

commercial, and industrial development. To determine the rate of debris generated for new construction, several major construction companies were questioned regarding methods they used when estimating debris generated from construction projects. The number of square feet of floor space in the building is multiplied by a waste generation rate of 0.25 cubic feet per square foot to arrive at the total volume of debris generated during the construction of the building.

The projection of construction waste into the future is based on a projected square footage for new construction by municipality when applied to the waste generation rate. This varies from other projections based solely on population. The exclusion of debris from demolition projects and roadway reconstruction, which vary substantially over time and place, may underestimate the rate of total generation of construction waste.

*Medical Waste* - Medical waste is generated from both hospital and non hospital sources. Hospital medical waste utilizes the number of hospital beds in each hospital and the estimated average daily occupancy rate. Based on this estimation a national generation factor of pounds per bed per day is used to determine hospital medical waste generation. The amount of non hospital medical waste generated is determined from municipal statistics compiled by the Arizona Board of Medical Examiners by physician. Thus as a means to ascertain estimates of non hospital waste by municipality, it was necessary to use the percentage distribution of physicians by community as an indicator.

*Green Waste* - Green waste consists of organic waste material produced in the care and maintenance of individual home or business lawns, gardens, and open spaces in addition to landscape materials from city and county parks and other open spaces. The generation rate is based on the production of household residential landscape waste, uncontained waste and the amount of residential and commercial waste disposed of by gardeners. This information was obtained through the City of Phoenix. MAG population and employment levels and projections were applied as appropriate.

#### Discard Rates

A discard rate identifies the percentage of waste that is not reused or reduced. Discard waste includes waste that may be later recovered for recycling or waste that is disposed.

#### Material Component Rates

A material component rate is the percentage of the waste stream by class that contains identified recyclable material. Many materials have the potential to be recovered and recycled from the waste stream. In the SWIMS database, these rates are mostly based on national data due to insufficient data on the composition of the local waste stream.

#### Recovery Rates

A recovery rate identifies that percentage of the material identified by the component rate which actually gets separated from the waste stream for processing. Thus if 50 percent of possible newspaper discarded gets recovered, the recovery rate is 50 percent. These rates may be varied to

create different scenarios.

### Recycling Rates

A recycle rate identifies that percentage of the material recovered which actually gets recycled. This rate accounts for the portion of the recovered material intended for recycling that is not processed or marketed. A portion of the materials intended to be recycled may be rejected due to contamination or a related reason.

### **Identifying the Full Cost of a Program**

In understanding the costs and benefits of a recycling program as part of solid waste management, it is valuable to report all of the costs and revenues associated with a program. A basic premise of such an analysis is that full cost reports will help government officials in their deliberations regarding needs, priorities and options. Unless all of the expenses and revenues associated with a program are identified, the cost of the program could be understated or overstated. Therefore, comparison with similar programs offered by other entities, or even a comparison over time in a single jurisdiction could be misleading. Compiling the information for such an analysis is vital. The Arizona Department of Environmental Quality (ADEQ) collects information on the costs and revenues involved in the operation of a recycling program through the Annual Waste Reduction and Recycling Survey. However, according to ADEQ, the information collected to date is insufficient to provide a complete analysis on a statewide basis. As jurisdictions begin to understand the type of information that needs to be collected and this information is compiled an analysis could be completed in the future.

The ADEQ Annual Waste Reduction and Recycling Survey attempts to collect information in three main areas in accordance with Arizona Revised Statutes 49-832.c.4. First, the costs of the recycling program should be compiled. This could include funds for such items as land, personnel, construction and equipment. It is important to also tabulate costs for overhead, insurance, consultants, additional procurement programs (buy recycled) and other related costs. Revenues of a program are a second major area of information collected by the state. Revenues could be funds from the sale of recyclable items or the sale of a usable item. The third area of information reported to the state is the costs avoided due to recycling programs. Avoided costs are those funds that would have been spent to dispose of waste in a landfill (or otherwise legally rid of waste) but instead were avoided due to marketing recyclable materials. Typically, the avoided cost is the amount of money saved in tipping fees but could also include money saved from the avoidance of siting and constructing a new landfill or transfer station. One additional aspect to consider in a program evaluation, according to the state, is less obvious types of savings. These savings could include resource conservation, energy savings and less pollution.

Understating the costs or revenues of a program is usually a result of overlooking expenses that are related to a program. The costs and revenues that are difficult to quantify are usually the type most easily overlooked. In addition, it should be recognized that costs will change over time and the most

cost intensive period would likely occur in the initial stages of the program. The purchase of additional equipment and upgrades as the programs expand could also significantly impact the costs of the program. Evaluating costs over an extended period of time is valuable. Considering the sharing of costs among entities can be useful for small jurisdictions.

It is helpful to utilize a worksheet or to establish a data collection system. A jurisdiction could begin by analyzing the information collected by the state. However, if the community needs a more in-depth comparison it would be valuable to collect detailed information. This is especially true if a jurisdiction is trying to evaluate the difference between building a landfill or a material recovery facility or if a recycling program is in the initial stages or potentially undergoing expansion. There are many good resources available to provide a foundation. Some of these resources include:

- Columbia University, Public Technology, Inc., and the International City Management Association. *Evaluating Residential Refuse Collection Costs: A Workbook for Local Government and Worksheet Supplement*. Washington, D.C.: Public Technology, 1978.
- Kelly, Joseph T. *Costing Government Services: A Guide for Decision Making*. Washington, D.C.: Government Finance Officers Association, 1984.
- United States Environmental Protection Agency. *Decision-Makers' Guide to Solid Waste Management, Volume II*. Washington, D.C.: EPA 530-R-95-023, 1995.
- United States Environmental Protection Agency. *Measuring Recycling: A Guide for State and Local Governments*. Washington, D.C.: EPA 530-R-97-011, 1997.

## **POTENTIAL INCENTIVES AND OBSTACLES**

In the evaluation of recycling programs, it is helpful to understand recycling incentives and impediments. The State of Arizona collects this information through an annual survey. In 1997, five main factors were listed that encourage recycling based on information collected by jurisdictions throughout the state. First, the availability of existing programs was identified as an incentive to recycle. Second, community involvement and support were listed as an incentive to recycle. Third, the financial benefits of recycling programs often create an incentive and an opportunity to maintain a program. Education and awareness programs, from school curricula to newsletters, are listed as the fourth incentive and an important trend in encouraging recycling. Finally, cooperation and partnerships were identified as incentives in establishing and maintaining a recycling program.

Four main obstacles to recycling were identified by respondents to the annual state survey. The most frequent obstacle to recycling is financial impediments. Community attitude and education are also listed as an impediment to recycling. The third obstacle to establishing or maintaining a recycling program is the lack of staff. This concern was identified by many smaller, rural jurisdictions. The fourth most frequently identified impediment was the lack of infrastructure and logistical problems in operating recycling programs.

In the MAG region, member agencies have indicated through the regional forum that compiling and



analyzing information that is specific to the valley could be a factor that would encourage recycling. Also, some members have expressed an interest in joint efforts to facilitate recycling programs. These activities will be addressed through the development and upgrade of the MAG Solid Waste Information Management System (SWIMS), the regional recycling website and the regional forums. Consequently, many obstacles listed on the state surveys could be mitigated in the MAG region. Recyclable commodity markets are an additional factor to consider when assessing recycling programs. Revenue gained for materials will fluctuate over time due to the seasonal nature of markets and other related circumstances. Recycling material markets are relatively young and therefore markets have experienced exaggerated price fluctuations which are not unusual for a new commodity on the market. Local governments usually negotiate terms for market price fluctuation in the contracts they establish with processors or brokers of recyclable materials. Information regarding market prices is available through many sources. Sources for current information regarding market prices could be obtained through the MAG regional recycling web site at [www.mag.maricopa.gov/rrie/rrie.htm](http://www.mag.maricopa.gov/rrie/rrie.htm) or by contacting MAG staff at (602) 254-6300.

## **ADDITIONAL RESOURCES**

There are many organizations in the MAG region that have services of various levels to offer to jurisdictions that are interested in recycling activities. The following list of organizations is provided for information only.

**Arizona Department of Environmental Quality:** The 1990 Arizona Solid Waste Recycling Act established the Arizona Recycling Program within the Arizona Department of Environmental Quality (ADEQ). According to ADEQ, program responsibilities include distributing and administering funding for grant programs (listed below), and conducting public education, technical assistance and outreach events. ADEQ has also indicated that it has partnered with the Arizona Department of Commerce to attract recycling related companies to the state, keeping the economic benefits of recycling in Arizona. For more information call: (602)207-4133.

### Waste Reduction Assistance (WRA) Grant

According to ADEQ, the focus of the Waste Reduction Assistance (WRA) Grant is to provide funding for projects that divert significant amounts of material from the solid waste stream, or that represent comprehensive programs designed to achieve high solid waste diversion levels including research and development projects. All projects must be related to one or more of the following: the proper disposal of solid waste, source reduction, reuse, recycling, buying recycled content products and composting.

### Waste Reduction Initiative Through Education (WRITE) Grant

The focus of the Waste Reduction Initiative Through Education (WRITE) Grant, according to ADEQ, is to provide funding assistance to projects that promote the education of Arizona citizens concerning issues related to the proper disposal of solid waste, source reduction, recycling, buying

recycled content products and composting. The types of education projects may include, but are not limited to school curricula, workshops, seminars, publications, mail outs and flyers, and mass media campaigns.

**Arizona Department of Commerce, Environmental Business Development:** The Arizona Department of Commerce is the lead economic development agency in the State of Arizona. The Environmental Business Development project works to expand markets for recyclable goods in Arizona, in cooperation with a statewide industry network. For more information call: (602) 280-1398.

**Arizona Environmental Strategic Alliance:** The Arizona Environmental Strategic Alliance is a partnership of businesses and governments devoted to demonstrating environmental leadership, raising public awareness and implementing projects to preserve the environment in Arizona. For more information call: (602) 207-4444.

**Arizona Recycling Coalition (AzRC):** The AzRC is a membership-based, non-profit organization dedicated to promoting recycling and waste reduction throughout Arizona and the southwestern region. The objectives of AzRC are to improve the awareness and need for waste reduction, to assist in the advancement of recycling, and to communicate the benefits of conserving natural resources. For more information call: (602) 362-1172.

**Southwest Public Recycling Association (SPRA):** SPRA is a non profit organization whose voting members include cities, towns, counties and Native American tribes throughout the Southwest. The mission of SPRA is to promote, strengthen, and provide leadership in source reduction, reuse, recycling and composting. For more information call: (502) 791-4069.

**Solid Waste Association of North America (SWANA):** SWANA is a membership organization representing solid waste professionals in both the public and private sectors across North America which is dedicated to the sound environmental and economic management of municipal solid waste. For more information call: (602) 644-3222.

## CONCLUSION

This guidance document is designed to provide a basic foundation of information and a list of resources for further technical assistance in establishing and maintaining recycling programs in the MAG region. The Solid Waste Information Management System (SWIMS) database was recently updated to provide an overall planning instrument that incorporates socioeconomic, waste generation, waste disposal and recycling assumptions about the MAG region and the individual municipalities. In addition, information is provided on incentives and impediments to recycling and additional resources are listed for further technical assistance in recycling program development.